

Notice of Allowability

Application No.

10/769,824

Examiner

Zhuo H Li

Applicant(s)

BARROSO ET AL.

Art Unit

2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2/2/2004.
2. ☒ The allowed claim(s) is/are 11-16,21 and 22.
3. ☒ The drawings filed on 02 February 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 2/2/04 and 3/10/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S STATEMENT AND REASONS FOR ALLOWANCE

1. Claims 11-16 and 21-22 are allowed.

2. The following is an examiner's statement of reasons for allowance:

Applicant's invention is drawn to a method and apparatus for relaxing the inclusion requirement in a two-level cache system in order to maximizing the use of on-chip cache memory capacity and in a chip multiple processing system, and minimize data replication and on-chip data traffic without incurring an increased second level hit latency or occupancy (i.e., a second-level cache comprising a duplicate tag-state structure of all first-level caches in order to allow a simultaneous lookup for data in the first-level and second-level tag-state arrays without having to replicate the data, and there is only one instance that is an owner instance for each cache line present in the two-level cache system, and the indication of ownership being provided only in a second-level cache).

Applicant's independent claim 20 recites, *inter alia*, a two-level cache system in a chip-multiprocessor (10) with a structure defined in the specification (pages 5-12), associated cache lines with an indication of ownership so that among one or more than one instances of each cache line present in the two-level cache system, there is only one instance that is an owner instance, the indication of ownership being provided only in the second-level cache, and associated cache lines with state information that includes the indication of ownership, the state information for cache lines present in the first level cache being maintained in the second-level cache, administer cache line ownership and write-backs based on a predetermined guideline.

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Applicant's invention of claim 20 comprises a particular combination of elements, which is neither taught nor suggested by the prior art.

Applicant's independent method claim 11 recites, *inter alia*, the steps of associating cache lines with an indication of ownership so that among one or more than one instances of each cache line present in the two-level cache system, there is only one instance that is an owner instance, the indication of ownership being provided only in the second-level cache, and associating the cache lines with state information that includes the indication of ownership, the state information for cache lines present in the first-level cache being maintained in the second-level cache, and administering cache line ownership and write-backs based on a predetermined guideline. These steps, in combination with the remaining steps of claims 14-16, are neither taught nor suggested by the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zhuo H Li whose telephone number is 571-272-4183. The examiner can normally be reached on M-F 9:00am - 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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4. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zhuo H. Li

Patent Examiner

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PRIMARY EXAMINER
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